Docket No. AUS920010447US1

DIGITAL RIGHTS MANAGEMENT

BACKGROUND OF THE INVENTION

1. Technical Field:

The present invention relates to access to electronic resources, and more specifically to the transfer of access rights.

2. Description of Related Art:

Digital Rights Management (DRM) is a system for protecting the copyrights of digital content that is distributed online. Examples of such digital content includes e-books, music, and movies. DRM systems are an important element in safeguarding against unauthorized access and use of digital properties. DRM systems often use the technique of secure distribution, where users need custom software to access content. This software implements the rights management properties. Typically, the content generator sets up rules for access during packaging for distribution. The software verifies that the rights information associated with the content being accessed is being respected. The rights information associated with the content typically contains the manufacturer information. It is the cornerstone of the rights enforcement mechanism.

DRM is an important aspect of conducting business on the Internet. It prevents unauthorized distribution and usage of content. Typically, digital rights are managed through two mechanisms: secure distribution, where the user has to install custom software to access content,

and digital watermarking, where the manufacturer takes the responsibility of verifying proper usage by using watermark identity spiders. Such mechanisms help manufacturers to regulate and monitor the access of digital properties.

However, none of the solutions address the issue of transferring of digital rights from one owner to another, either permanently or temporarily. It is a common practice in the real world for property owners to sell their properties to others. Such an act legally transfers the ownership to another party. Currently, there is no mechanism to accomplish the same task for digital properties over the Internet.

In addition, there is no current method for maintaining a record of ownership information. Current ownership, as well as the chain of ownership, can provide important information. For example, this information can be of use both financially (for manufactures) and legally (in case of disputes, as well as for transfer of digital properties).

When a customer purchases a product, that customer also purchases a set of property rights, such as the right to lend and resell. Different rights "packages" might be sold to a customer, which would dictate which rights that customer could transfer. By the same token, this set of rights would also be inherited by subsequent transferees of the property. However, there is no current method for specifying DRM selling and lending privileges and the inheritance of these privileges.

Therefore, it would be desirable to have a method and mechanism for transferring digital property rights and maintaining records of chains of title. It would

also be desirable to have a method for specifying selling and lending privileges for digital properties and the inheritance of such privileges.

SUMMARY OF THE INVENTION

The present invention provides a method, program, and system for augmenting digital rights management. The invention comprises associating two fields with an electronic document. The first field identifies the current owner of the electronic document, and the second field contains information about previous ownership of the electronic document. If ownership of the electronic document is transferred from the current owner to a subsequent owner, the current owner's name in the first field is replaced with the subsequent owner's name. In addition, information about the subsequent owner is added to the ownership history field.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objectives and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

Figure 1 depicts a pictorial representation of a network of data processing systems in which the present invention may be implemented;

Figure 2 depicts a block diagram of a data processing system that may be implemented as a server in accordance with a preferred embodiment of the present invention;

Figure 3 depicts a block diagram illustrating a data processing system in which the present invention may be implemented;

Figure 4 depicts a diagram illustrating ownership information associated with digital property in accordance with the present invention;

Figure 5 depicts a diagram illustrating the transfer of digital property and the update of ownership information in accordance with the present invention;

Figure 6 depicts a flowchart illustrating an overview of the augmented DRM in accordance with the present invention;

Figure 7 depicts a diagram illustrating lending information associated with digital property in accordance with the present invention;

Figure 8 depicts a flowchart illustrating DRM loans in accordance with the present invention; and

Figure 9 depicts a flowchart illustrating the process of verifying transfer rights in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the figures, **Figure 1** depicts a pictorial representation of a network of data processing systems in which the present invention may be implemented. Network data processing system **100** is a network of computers in which the present invention may be implemented. Network data processing system **100** contains a network **102**, which is the medium used to provide communications links between various devices and computers connected together within network data processing system **100**. Network **102** may include connections, such as wire, wireless communication links, or fiber optic cables.

In the depicted example, a server **104** is connected to network **102** along with storage unit **106**. In addition, clients **108**, **110**, and **112** also are connected to network **102**. These clients **108**, **110**, and **112** may be, for example, personal computers or network computers. In the depicted example, server **104** provides data, such as boot files, operating system images, and applications to clients **108-112**. Clients **108**, **110**, and **112** are clients to server **104**. Network data processing system **100** may include additional servers, clients, and other devices not shown.

In the depicted example, network data processing system **100** is the Internet with network **102** representing a worldwide collection of networks and gateways that use the TCP/IP suite of protocols to communicate with one another. At the heart of the Internet is a backbone of high-speed data communication lines between major nodes or host computers, consisting of thousands of commercial, government, educational and other computer systems that

route data and messages. Of course, network data processing system **100** also may be implemented as a number of different types of networks, such as for example, an intranet, a local area network (LAN), or a wide area network (WAN). **Figure 1** is intended as an example, and not as an architectural limitation for the present invention.

Referring to **Figure 2**, a block diagram of a data processing system that may be implemented as a server, such as server **104** in **Figure 1**, is depicted in accordance with a preferred embodiment of the present invention. Data processing system **200** may be a symmetric multiprocessor (SMP) system including a plurality of processors **202** and **204** connected to system bus **206**. Alternatively, a single processor system may be employed. Also connected to system bus **206** is memory controller/cache **208**, which provides an interface to local memory **209**. I/O bus bridge **210** is connected to system bus **206** and provides an interface to I/O bus **212**. Memory controller/cache **208** and I/O bus bridge **210** may be integrated as depicted.

Peripheral component interconnect (PCI) bus bridge **214** connected to I/O bus **212** provides an interface to PCI local bus **216**. A number of modems may be connected to PCI bus **216**. Typical PCI bus implementations will support four PCI expansion slots or add-in connectors. Communications links to network computers **108-112** in **Figure 1** may be provided through modem **218** and network adapter **220** connected to PCI local bus **216** through add-in boards.

Additional PCI bus bridges **222** and **224** provide interfaces for additional PCI buses **226** and **228**, from

which additional modems or network adapters may be supported. In this manner, data processing system **200** allows connections to multiple network computers. A memory-mapped graphics adapter **230** and hard disk **232** may also be connected to I/O bus **212** as depicted, either directly or indirectly.

Those of ordinary skill in the art will appreciate that the hardware depicted in **Figure 2** may vary. For example, other peripheral devices, such as optical disk drives and the like, also may be used in addition to or in place of the hardware depicted. The depicted example is not meant to imply architectural limitations with respect to the present invention.

The data processing system depicted in **Figure 2** may be, for example, an eSeries pServer system, a product of International Business Machines Corporation in Armonk, New York, running the Advanced Interactive Executive (AIX) or Linux operating systems.

With reference now to **Figure 3**, a block diagram illustrating a data processing system is depicted in which the present invention may be implemented. Data processing system **300** is an example of a client computer. Data processing system **300** employs a peripheral component interconnect (PCI) local bus architecture. Although the depicted example employs a PCI bus, other bus architectures such as Accelerated Graphics Port (AGP) and Industry Standard Architecture (ISA) may be used. Processor **302** and main memory **304** are connected to PCI local bus **306** through PCI bridge **308**. PCI bridge **308** also may include an integrated memory controller and cache memory for processor **302**. Additional connections to PCI local bus **306** may be made through direct component

interconnection or through add-in boards. In the depicted example, local area network (LAN) adapter **310**, SCSI host bus adapter **312**, and expansion bus interface **314** are connected to PCI local bus **306** by direct component connection. In contrast, audio adapter **316**, graphics adapter **318**, and audio/video adapter **319** are connected to PCI local bus **306** by add-in boards inserted into expansion slots. Expansion bus interface **314** provides a connection for a keyboard and mouse adapter **320**, modem **322**, and additional memory **324**. Small computer system interface (SCSI) host bus adapter **312** provides a connection for hard disk drive **326**, tape drive **328**, CD-ROM drive **330**, and DVD drive **332**. Typical PCI local bus implementations will support three or four PCI expansion slots or add-in connectors.

An operating system runs on processor **302** and is used to coordinate and provide control of various components within data processing system **300** in **Figure 3**. The operating system may be a commercially available operating system, such as Windows 2000, which is available from Microsoft Corporation. An object oriented programming system such as Java may run in conjunction with the operating system and provide calls to the operating system from Java programs or applications executing on data processing system **300**. "Java" is a trademark of Sun Microsystems, Inc. Instructions for the operating system, the object-oriented operating system, and applications or programs are located on storage devices, such as hard disk drive **326**, and may be loaded into main memory **304** for execution by processor **302.**

Those of ordinary skill in the art will appreciate that the hardware in **Figure 3** may vary depending on the implementation. Other internal hardware or peripheral devices, such as flash ROM (or equivalent nonvolatile memory) or optical disk drives and the like, may be used in addition to or in place of the hardware depicted in **Figure 3**. Also, the processes of the present invention may be applied to a multiprocessor data processing system.

As another example, data processing system **300** may be a stand-alone system configured to be bootable without relying on some type of network communication interface, whether or not data processing system **300** comprises some type of network communication interface. As a further example, data processing system **300** may be a Personal Digital Assistant (PDA) device, which is configured with ROM and/or flash ROM in order to provide non-volatile memory for storing operating system files and/or user-generated data.

The depicted example in **Figure 3** and above-described examples are not meant to imply architectural limitations. For example, data processing system **300** also may be a notebook computer or hand held computer in addition to taking the form of a PDA. Data processing system **300** also may be a kiosk or a Web appliance.

DRM systems enforce a set of rules set up by the publisher when packaging digital property for distribution. To access content, the user must have special software that can interpret the business rules. Once the access is authenticated, the user is allowed to

use the content based on the rights agreement in force (i.e. the software manages access after verifying that the user has satisfied all requirements for access).

Referring to **Figure 4**, a diagram illustrating ownership information associated with digital property is depicted in accordance with the present invention. In the present invention, digital rights information **401** is augmented with two fields. Current owner **402** refers to the party that currently owns the rights to the digital property in question. This information can be used in rights enforcement (i.e. only the current owner can use the property) and also to legally transfer the property among parties. Ownership history **403** is a list of prior owners. This can provide valuable information to the manufacturer (about potential customers for other products) and can also be useful in case of disputes.

Access control software can check these variables to ensure that digital rights are being respected and can send back information to the manufacturer in case of abuse or violation.

Referring now to **Figure 5**, a diagram illustrating the transfer of digital property and the update of ownership information is depicted in accordance with the present invention. In the present example, before being transferred, the property (digital document) **501** is registered to Owner 2. This is indicated in the current owner field **502**. The ownership history field **503** shows that before property **501** was owned by Owner 2, it was first owned by Owner 1. When property **501** is transferred (i.e. sold or loaned) to Owner 3, the current owner field

502 is updated to reflect that the fact that Owner 3 now owns property **501**. In addition, the ownership history field **503** is also updated to include Owner 3.

Optionally, the specifics of the transaction may also be stored in a backup server **504**. Backup server **504** contains a copy of the information stored in ownership history field **503** and current owner field **502**. When property **501** is transferred from Owner 2 to Owner 3, the transaction is recorded in server **504**, and the information in server **504** is updated to reflect the new information entered in fields **502** and **503**.

Referring to **Figure 6**, a flowchart illustrating an overview of the augmented DRM is depicted in accordance with the present invention. When digital property is first sold (step **601**), the DRM inserts the buyer's name in the ownership field (step **602**). In the ownership history, the time period of ownership for each owner is digitally signed by that owner (seller) (step **603**). Thereafter, for every use of the product, the software validates that the invoker has ownership rights, and then allows access. When the ownership is transferred, the seller adds an entry with information about the future owner (buyer) (step **604**). The seller then digitally signs this entry (step **605**). This process is analogous to title transfer in tangible property and endorsement of commercial paper. The buyer (new owner) is then free to use the digital property. As an alternative, the current owner can set an ownership password field to a mutually agreed value, and thereafter, the new owner can set the field to his or her choice. In most cases, the title would be saved with the digital property itself, which

would reduce the record keeping complication of storing the title and property separately.

All authentication and validation by the special software can be performed using digital signatures and certificates, as well as other well known techniques.

Optionally, the above information may be relayed back to the original manufacturer, so that the manufacturer can maintain a record of ownership history (step **606**). The original manufacturer may charge a transaction fee for each transfer of ownership (if part of the contract).

As mentioned in relation to **Figure 5**, a server may also store the associated information as an additional safeguard against tampering (step **607**).

The present invention can also be used to allow lending of digital content (property) for limited periods of time.

Referring to **Figure 7**, a diagram illustrating lending information associated with digital property is depicted in accordance with the present invention. As in **Figure 4**, the digital property information **701** is augmented with a current owner field **702** and an ownership history field **703**. In addition, a current borrower field **704** in added. In addition to identifying the borrower, the field **704** may also indicate the time period of the loan (not shown). Borrower field **704** may contain several names if the lender is able to lend property **701** to multiple borrowers (e.g. electronic libraries).

Referring now to **Figure 8**, a flowchart illustrating DRM loans is depicted in accordance with the present invention. The process is similar to that in **Figure 6**.

When the current owner has loaned the property (step **801**), the owner will add an entry with the information about the borrower into the current borrower field (step **802**). To support lending, a loan flag is set to "true" (step **803**), and the time period specifying the duration of the loan is entered (step **804**). Optionally, the manufacturer may also be notified of the loan (step **805**). After the loan period expires (step **806**), the access control software no longer permits the borrower to access the content.

The process flows depicted in **Figures 6** and **8** are dependent upon the rights and privileges of the owner of the digital property in question. Another aspect of the present invention is the ability to specify and control the types of transfer rights the owner of digital property possesses, and how those specified rights are inherited by subsequent transferees of the property.

Referring to **Figure 9**, a flowchart illustrating the process of verifying transfer rights is depicted in accordance with the present invention. In addition to the owner information and ownership history, the rights information associated with digital property is augmented with the following transfer rights:

- Lending information: This record provides answers to the questions: Does this owner have the privilege of lending this property? Can the owner lend to multiple people simultaneously, and if so, to how many? (For example, simultaneous lending might be used by a library.) Will the owner be allowed to use the property while it is out on loan?

- Reselling information: Information on the privilege to resell (e.g. allow reselling to only one person, if the original owner is an individual).
- Media players or platforms on which the content is playable: The merchant or manufacturer may wish to restrict the digital properties to be playable on certain target devices.

When the owner of digital property transfers (i.e. Sells or loans) that property (step **901**), the access control software can check the owner's transfer rights to ensure that digital rights are being respected (step **902**). If the attempted transfer does not fall within the owner's transfer rights, the access control software will not validate the transfer and will prevent the transferee's access to the digital content (step **903**). In addition, the access control hardware will send back information to the manufacturer in case of abuse or violation (step **904**). If the attempted transfer does fall within the owner's transfer rights, the access control software will validate the transfer of the digital property based on the privileges that the owner has, and allow the transferee to access the digital content (step **905**).

The access control software may also determine the transferee's rights, according to the rights of the transferor and the nature of the transfer (step **906**). There are various cases to be considered for the inheritance of privileges, with rights inheritance often dependent upon the classification of the original owner. For example, a borrower typically will have no privileges other than to view or listen to the digital property.

A merchant or manufacturer may set up a price schedule based on the privileges that the user desires. For example, a user who will not be lending or reselling the material may get a deep discount for the digital property. Where the original owner is an individual (as opposed to a retailer), a purchaser of the digital property will usually inherit the same privileges that the original owner had. In the case of a retailer (who has the right to resell to multiple customers), individual buyers only inherit a subset of the retailer's privileges (i.e. view or listen, but not resell).

It is important to note that while the present invention has been described in the context of a fully functioning data processing system, those of ordinary skill in the art will appreciate that the processes of the present invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms and that the present invention applies equally regardless of the particular type of signal bearing media actually used to carry out the distribution. Examples of computer readable media include recordable-type media, such as a floppy disk, a hard disk drive, a RAM, CD-ROMs, DVD-ROMs, and transmission-type media, such as digital and analog communications links, wired or wireless communications links using transmission forms, such as, for example, radio frequency and light wave transmissions. The computer readable media may take the form of coded formats that are decoded for actual use in a particular data processing system.

The description of the present invention has been presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art. The embodiment was chosen and described in order to best explain the principles of the invention, the practical application, and to enable others of ordinary skill in the art to understand the invention for various embodiments with various modifications as are suited to the particular use contemplated.